



# Severe Colonic Bleeding

W. RUSSELL SMITH, M.D., and CLARENCE J. BERNE, M.D.  
Los Angeles

■ *Patients requiring emergency operation for severe acute colonic hemorrhage usually arrive in the operating room inadequately studied and the point of bleeding not known. A well planned procedure for making an operative diagnosis is lacking.*

*The fact that diverticular disease is the most common cause of massive colonic bleeding, dominates the surgical management of this problem. A critical interpretation of the color and the consistency of the stools must be made by the surgeon. Since the bleeding lesion is usually otherwise clinically silent, the character of the stools may be the only indication of the level of bleeding and the rate and the amount of the blood loss. A proctoscopic examination, followed by an emergency barium enema study if possible, is always done before subjecting a patient to laparotomy.*

*The indications for emergency operation include acute exsanguinating hemorrhage, less severe but persistent colonic bleeding and recurrent colonic bleeding. The steps for the operative diagnosis and the surgical procedure utilized for a specific situation are discussed.*

MODERATE OR SEVERE acute colonic bleeding may at any time become exigent and demand immediate and very aggressive management. Occasionally the bleeding may be massive from the onset and require very early emergency surgical intervention to prevent exsanguination. The surgical problems presented by colonic bleeding have been less adequately studied than those related to severe bleeding from the upper gastrointestinal tract. The methods used for determining the level and the causes of bleeding in the lower mid-bowel and colon are much less precise

than those available for getting such information about the upper tract. Further, the operative diagnostic procedures available at the time of laparotomy for severe colonic bleeding are less accurate and much more cumbersome than those for gastroduodenal bleeding. Operative diagnosis is compounded by the length and the anatomical course of the colon. Such severe colonic bleeding usually occurs in older patients, many of whom have advanced arteriosclerotic cardiovascular renal disease. With consequent areas of borderline perfusion, there is an enhanced susceptibility to the complications of hemorrhage and resultant hypovolemia. The purpose of this paper is to present current methods for the diagnosis and management of acute colonic bleeding.

From the Department of Surgery, University of Southern California School of Medicine, Los Angeles.

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## Etiology

In adults, the most common cause of mild and moderate colonic bleeding is carcinoma, but it is uncommon for such a lesion to cause massive bleeding. In our series of patients with acute severe colonic bleeding requiring surgical operation, diverticulosis was the cause in over 70 per cent. In over half of these, diverticulitis was not present. In the others, with one exception, diverticulitis was mild.

Scarborough<sup>12</sup> and other investigators<sup>4,10</sup> have repeatedly emphasized that simple diverticulosis is not a common cause of acute colonic bleeding, stating that if a patient is observed long enough an associated polyp or an occult malignant lesion will ultimately be found. In the recent surgical literature there is quite consistent agreement that diverticulosis is the most common cause of acute massive colonic hemorrhage.<sup>3,6,7,13</sup> Other much less frequent causes of massive bleeding are carcinoma, polyps, ulcerative colitis and relatively rare lesions such as pseudolipoma of the ileocecal valve. Therefore, in a case in which the colon is overtly otherwise normal, either by radiological examination or as observed at operation, diverticular disease, if present, is overwhelmingly the most likely cause of the bleeding. This fact dominates the surgical management of massive colonic bleeding.

## Terminology

Definition is needed for certain clinical terms concerning gastrointestinal bleeding. The word *hematemesis* is used to describe vomitus containing red blood with or without clots, and connotes eruptive bleeding. This is almost invariably from above the ligament of Treitz and more often than not of gastric origin. *Melenemesis* is present when the vomitus contains dark blood. Such dark blood is characteristic of noneruptive esophageal or gastric bleeding, or severe duodenal bleeding with regurgitation. *Hematochezia* indicates the passage from the rectum of bright red blood with or without clots. Only occasionally is this due to eruptive downward bleeding from a duodenal ulcer or from any source in the mid-bowel below that level. Usually, in adults, it is indicative of moderate or severe bleeding from the colon. *Melena vera* is used to describe material containing black ("old") blood when passed per rectum. Characteristically, this material is coal black, shiny, foul smelling, sticky and firm. In appearance and consistency it closely resembles tar. Stools of this type occur when a large amount of blood traverses the small bowel and colon slowly. During transit, most of the water in the shed blood is absorbed and this water, restored to the circulating blood, brings about hemodilution. *Pseudomelena* describes a black stool that, on casual examination, looks like melena.

However, it is not as shiny, sticky or firm. On close inspection of a recently passed stool, the surface has a dark red sheen and when placed against a white background (cardboard container), a narrow red zone may be seen around the periphery. Typically, stools of this type are seen when moderate bleeding into the right colon occurs. A similar hemorrhage into the lower colon would produce hematochezia. Gradations occur between pseudomelena and hematochezia depending upon the rate and volume of the shed blood and the level of input into the colon.

## Diagnosis of Level of Bleeding

Uniquely, most of the lesions productive of acute colonic bleeding are otherwise clinically silent. Consequently, determining the level of the bleeding depends in large part on an unusually careful study of the color and consistency of the stools by the surgeon. If blood is vomited, obviously the source is high in the gastrointestinal tract. However, gastroduodenal bleeding without vomiting can often easily be detected if a gastroduodenal tube is put in place. Without such intubation, gastroduodenal bleeding may be completely overlooked. The presence of melena vera almost completely excludes the colon as the site of origin of the blood. When pseudomelena or hematochezia is present, a colonic source of the bleeding should always be strongly suspected. However, hematochezia with shock should always suggest duodenal ulcer as the cause. Hematochezia without shock is much more indicative of colonic bleeding. Preservation of the stool for early inspection by the surgeon, instead of relying on the nurses' notes, may be critical in differentiating borderline hematochezia, pseudomelena and melena vera. It is to be emphasized that, unless this is done, these differentiations indicative of the various levels, rates and amounts of gastrointestinal blood loss are often not made and not critically interpreted. This fact, in conjunction with the lack of a "vigorous diagnostic approach"<sup>8</sup> actually may result in an operation directed at one end of the intestinal tract when the bleeding is arising from the other.

## Management

When a patient has major gastrointestinal bleeding, a "bleeding chart" recording the patient's course is started. This includes the vital signs, hematocrit, the amount, character and route of blood loss, the amount of blood given, and other pertinent data. With the data thus progressively summarized, the site of input and the amount of bleeding can be more precisely judged. In addition to a complete history, physical examination and the data on the bleeding chart, the patient must be asked particularly about any abnormal bleeding tendencies and any chronic

use of drugs, especially anticoagulant therapy and gastric mucosal irritants. A platelet count and determination of prothrombin time and blood urea nitrogen are needed in addition to the routine studies. In the absence of renal insufficiency, hyperazotemia is strongly suggestive of bleeding high in the tract. Blood transfusions, intravenous colloids and other fluids are given as indicated. Concurrently, a mercury weighted tube is passed into the stomach if there is the slightest possibility that the bleeding could be originating from the upper gastrointestinal tract. This is intermittently aspirated and not placed on continuous suction. If the gastric aspirate does not show blood, meticulous proctoscopic examination, using good suction apparatus, is carried out. Laparotomy for colonic hemorrhage should never be done unless there is proctoscopic proof that transrectal control of the bleeding is not possible. If there is sustained profuse hemorrhage and the blood volume cannot be maintained satisfactorily, exploratory laparotomy may be indicated. One should always be aware of the possibility of the production of a measurable defect in coagulation induced by the transfused blood if more than 3,000 ml is required in less than 24 hours. If more than that amount is needed, operation may be advised before such a coagulopathy becomes severe. If the bleeding is less severe than that, an emergency barium enema study is usually done as soon as the original blood loss has been replaced. In spite of the radiologist's frustrations associated with a barium enema done under such adverse conditions, it is an essential part of the study if the nasogastric tube has not revealed blood. A saline cleansing enema should be given to clear the right colon. Without such an enema, in patients with this degree of bleeding the left colon is usually quite well shown by the barium enema but the right colon is usually poorly visualized. The barium enema will usually demonstrate larger lesions such as those produced by carcinoma, polyps, diverticula or ulcerative colitis. The barium enema may show a normal colon in the presence of bleeding of colonic origin. Hypaque® is generally inferior to barium for this type of study.

When the foregoing management has been completed, 12 to 24 hours may have elapsed. The blood volume should have been restored to normal and the decreased red cell mass adequately corrected. If the amount of blood required for maintenance is greater than 1,500 ml per 24 hours, operation is advisable, whether or not a lesion has been demonstrated. In the majority of patients, the colonic bleeding will subside and not that much blood will be required. With continued, but less severe bleeding, it is reasonable to temporize with such a patient for four to five days. In this time a very adequate study can be accomplished, including passing a nasogastric tube

into the small bowel and withdrawing it. If the barium enema has not established the cause of bleeding, an upper gastrointestinal series is done during this period. If gastroduodenal bleeding is still a possibility, esophagoscopy and gastroscopy may be indicated, and a barium study of the small bowel may be done. If the bleeding has not subsided by this time, and operation is considered necessary, and no demonstrable lesion has been found, it can be reasonably concluded that the bleeding point is not in the upper tract. Operation may be advised at this time in order to detect the causative lesion while it is actively bleeding. Such a policy is uniquely important because in the colon there is a high frequency of seemingly innocent diverticular disease that is responsible for the bleeding.

### Indications for Emergency Surgery

In the foregoing discussion on the concurrent management and diagnosis of severe colonic bleeding, operation was advised in three different situations. In the first, the patient had profuse exsanguinating hemorrhage, nasogastric intubation was feasible and negative, but the barium enema was not possible. In the second group, the colonic bleeding was less severe, allowing time for a fairly complete study. Patients of this order required about 1,500 ml of blood per 24 hours for maintenance of blood volume. A third group was made up of patients with persistent but less severe bleeding averaging about 500 ml per 24 hours but without subsidence of bleeding; they were operated upon on the fourth or fifth day after a complete study was accomplished.

Even less severe colonic bleeding, if it is recurrent, may be an indication for emergency operation in order to try to detect the site of bleeding when previous studies have not shown a lesion likely to cause the bleeding.

It is paradoxical that when there is severe gastrointestinal bleeding in an aged patient, the surgeon's tendency is to become more conservative. Actually, though, since the risks of damage from hemorrhage are greater in the aged, it is probable that appropriate operation should be done earlier unless there are contraindications. The risks that are greater with age are myocardial insufficiency or infarction, cerebral vascular accident and thromboembolic disease.

### Operative Diagnosis

Nearly always if operation is done during active gastroduodenal bleeding, the surgeon will be able to detect the bleeding site and the causative lesion. This is not true of emergency operation that is done for bleeding into the colon with the cause unknown. The surgeon is easily baffled if the colon is tautly filled with blood and no lesion is evident. Also, diverticu-

losis may be immediately evident but cannot be initially assumed to be the cause of bleeding. The filling of the colon may be owing to retrograde bleeding from a site as far distant from the cecum as the rectum. In such circumstances the surgeon may, without further diagnostic steps, elect to do an abdominal colectomy or transverse colostomy.

The procedures available to make a precise operative diagnosis in the absence of an overt lesion are extensive and hazardous but may be justified if conditions permit. We initiate our procedure in such cases by segmentalizing the lower left colon with cloth-wrapped intestinal clamps<sup>5</sup> followed by serial transrectal irrigations of the segments. If the left lower colon is not found to be the site of bleeding, the right colon is explored. Colotomy of the ascending colon is done and the cecum everted for inspection. Colonoscopy of the remainder of the right colon and the transverse colon can then be done. After this is completed, any site of input of active bleeding will have been detected. At any step of the foregoing procedure, appropriate operation is done if the bleeding site is found. If no lesion has been found at this stage, a sigmoid colotomy is made and colonoscopy of the left colon is carried out because bleeding from an existent lesion may have stopped at the time of operation.

The irrigation is done with a No. 30 Bardex catheter and an inflatable balloon which is inserted preoperatively. This has been attached to a sterile apparatus which connects to a Y-tube with one limb to an elevated receptacle containing a solution of 1:10,000 of aqueous zephiran. The other limb is attached to a wall suction. This arrangement allows for alternate filling and emptying of the colon from below. Once the colon is completely cleansed, any bleeding into the segment will be evidenced by the appearance of fresh blood upon reirrigation.

The study of the sigmoid is carried out in two steps with such serial irrigations. First, the clamp is placed at the mid-sigmoid level and the lower sigmoid is irrigated. This clamp is then moved to the junction of the descending sigmoid and the entire sigmoid colon is then again irrigated. With the sigmoid colon clean and no source of bleeding found, the clamp is left at the descending sigmoid junction. While waiting for possible bleeding into the segment, the right colon is mobilized. The sigmoid colon is then again lavaged for fresh blood. If no blood appears, a cloth-wrapped clamp is placed across the right colon just proximal to the hepatic flexure. A 6 cm longitudinal colotomy incision is made in the first portion of the ascending colon above the cecum. Any blood in the lumen is aspirated and the mucosa is cleansed with an aqueous zephiran-soaked sponge. By everting the entire wall with one or two fingers, the mucosa of the cecum and ascending colon can

be completely and directly visualized. The ileocecal valve is readily seen and opened, and the mucosa of the terminal ileum then may be directly visualized. The clamp is then moved from the ascending colon to the distal transverse colon. The blood is aspirated from this segment and the ascending and transverse colon are carefully examined with a colonoscope. Depending on the length and the mobility of the left colon, it is optional at this point whether to serially irrigate the entire left colon for evidence of fresh blood or to make a sigmoid colotomy and examine the left colon colonoscopically. Our usual preference is first to irrigate as completely as possible. If this is unsatisfactory, the sigmoid colotomy is made and the entire left colon is examined.

At this point, all the mucosa of the colon has been carefully visualized. This may be an extensive, hazardous and unrewarding procedure. Detaching the flexures is usually the major difficulty in doing a complete colonoscopic examination. However, it is essential that trauma to the colon be minimized. A sterile sigmoidoscope is used and it is passed under direct vision with the obturator in place. The obturator is then removed, the light inserted and the overhead lights dimmed. With one hand on the outside of the colon at the distal end of the scope, the instrument is slowly withdrawn while the mucosa is manipulated at the end of the scope. A moderate amount of inflation of the colon may be helpful. As the lumen is nearly the size of the scope, the transverse and descending colon will lend themselves particularly well to this type of an examination and the mucosa is usually well visualized. In contrast to this, the lumen in the area of the cecum and the ascending colon has a larger diameter, but the bowel is more distensible and lends itself particularly well to eversion and direct visualization as described. Gentle handling of the mucosa is imperative because traumatic bleeding is easily produced by the scope and may be mistaken for the anticipated lesion. Additional colotomy may occasionally be required for better visualization of a particular area or segment.

## Operative Procedure

When the bleeding lesion is identified, the operation appropriate for the given situation is done. When a bleeding area or the segment of the colon from which bleeding is occurring is identified, but without a demonstrable lesion, the segment should be resected, if feasible. If no causative lesion is found and no bleeding area identified and diverticulosis is absent, a "blind" left colon resection cannot be justified. Closure of the incision in the hope that the bleeding will subside (which it may do temporarily) cannot be justified. In the very unusual situation with no lesion identified and diverticulosis not pres-

ent, our procedure of choice is proximal transverse colostomy which will localize and usually control the bleeding if the source is distal to the colostomy. Should the bleeding continue from the proximal limb, temporary ileostomy may be required to save the patient. Then an elective right colectomy may be done later.

With diverticulosis of the lower left colon present, and the remainder of the colon and gastrointestinal tract exonerated by the surgeon, a proximal transverse colostomy will usually control the bleeding if it is of diverticular origin. The preferable alternative is sigmoidectomy if this can be tolerated. This may wisely be accompanied by exteriorization of the right colon so that if subsequent bleeding occurs, the exteriorized colon can be opened and the bleeding site localized in relation to it; or the exteriorized colon may be opened initially.

If the diverticulosis is of both the right and left colon, transverse colostomy is usually done. If further severe bleeding from the proximal limb occurs, an ileostomy may be preferable to right colectomy. Abdominal colectomy with ileoproctostomy is a justified procedure for interim operation in such a patient where a cause for colonic bleeding cannot be found. It may be used as an emergency procedure where the conditions are very favorable and where diverticular disease is universal in the colon. We have found it satisfactory under these conditions. In one extremely complex case, success was achieved

with ileoproctostomy, leaving the abdominal colon intact, with the sigmoid cut end brought out as a neostomy. This avoided an ileostomy and colectomy in a patient who could not have tolerated an abdominal colectomy.

1930 Wilshire Boulevard, Los Angeles 90057 (Smith).

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